

# NASA Center Status



## Dryden Flight Research Center (DFRC) Thermal Capabilities & Status

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# Capabilities



- Analysis capabilities
  - MSC family (Patran, PThermal, Nastran, Marc)
  - Thermal Desktop
  - TPATH (aeroheating)
  - In house code development for aerothermal, ablation, shape change
- Facility capabilities
  - Flight Test
    - Testbed Aircraft: F-15D (Mach 2+, PW-229 engines), F-15B, F-18s, GIII, Ikhana
    - Flight qualified instrumentation (thermocouples, strain gauges, fiber optic TC & SG, IR)
  - Ground Test – Flight Loads Laboratory (FLL)
    - Large-scale thermal/structural testing of aircraft or components with custom-contoured banks of quartz (2500°F) or graphite (>3000°F) heaters
      - Large & Small Nitrogen Chambers – Thermal/structural testing in an inert atmosphere
      - Several smaller ovens – Various atmospheres, instrumentation, coupons, small test articles
      - Blackbody furnace – Optical pyrometer calibration, heat flux sensor development
    - High-temperature instrumentation validation and integration technology
      - Conventional and optical strain technology to 1800°F, thermocouple integration technology to 2800°F, heat flux sensor development & validation
    - Test chambers for altitude pressure/temperature testing aircraft equipment
    - Nondestructive evaluation capabilities
      - Pulsed thermography & acoustic emission
- Staffing
  - Research Aerostructures Branch (DFRC-RS), Thermostructural Group: 10 FTE, 3.5 WYE

**Flight Loads Laboratory**

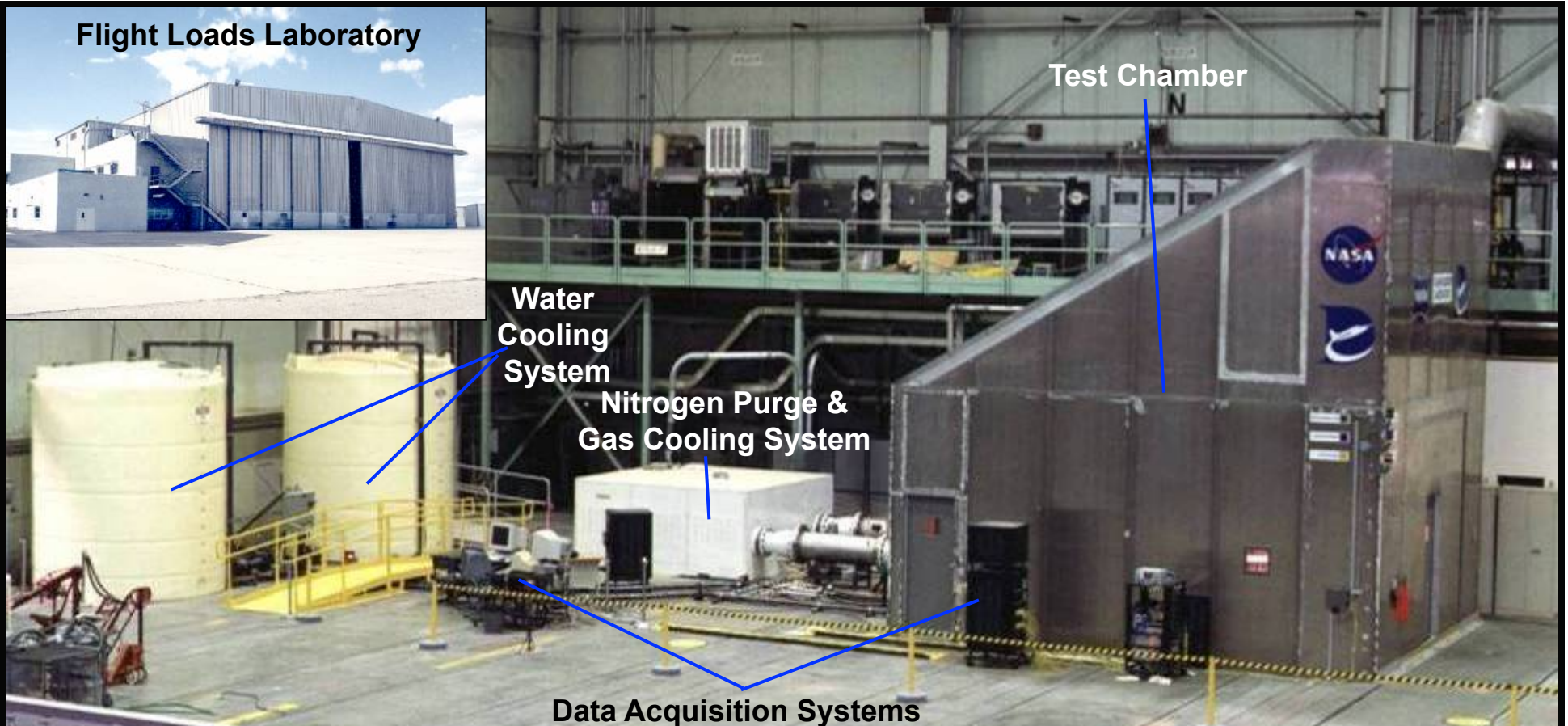


**Test Chamber**

**Water Cooling System**

**Nitrogen Purge & Gas Cooling System**

**Data Acquisition Systems**



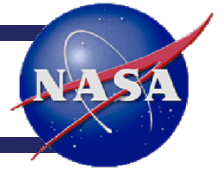
**4MW of Electrical Power**







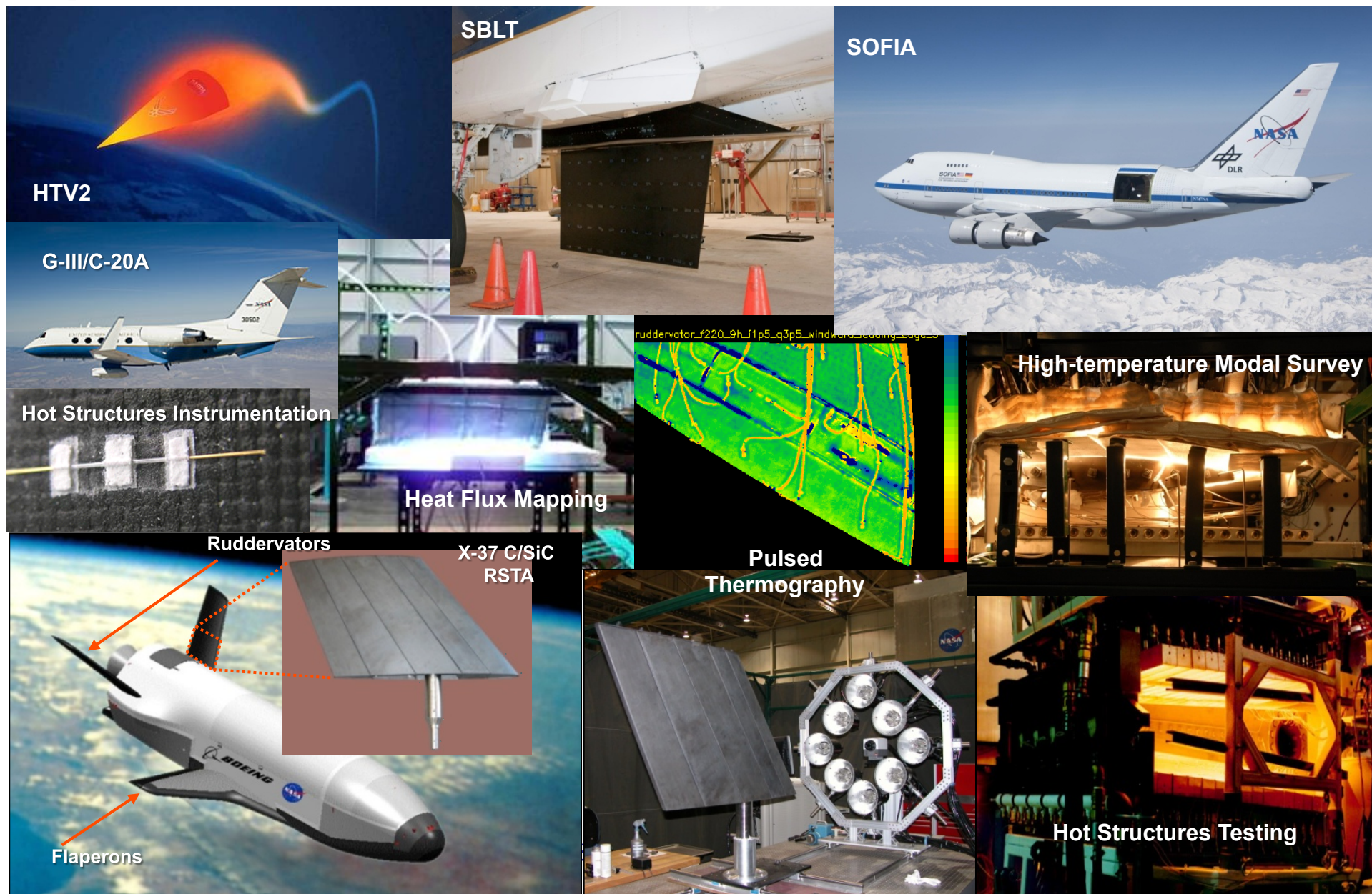
# Status



- Current projects/programs supported
  - ARMD HYP
    - SITPS (Structurally Integrated Thermal Protection System)
  - ARMD SUP
    - SBLT (Supersonic Boundary Layer Transition)
  - ARMD SUB
    - GIII Wing Glove Experiment (laminar flow)
  - SMD
    - SOFIA (Stratospheric Observatory for Infrared Astronomy)
  - Reimbursable
    - HTV2 (Hypersonic Technology Vehicle 2)
    - Testing several advanced TPS concepts
  - Research
    - High-temperature Modal Survey
    - Heat Flux Mapping
    - High-temperature sensor validation & integration



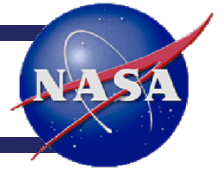
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# Issues and Outlook



- Capabilities issues
  - Flight Loads Laboratory (FLL) power controller cabinets getting upgraded to 264 thermal control channels, 65kW process chiller system, other minor upgrades
- Outlook
  - DFRC is in good health and is in a good position to support the administrator's direction of basic research, proving or disproving low TRL concepts ("TRL bumping") through ground & flight test with analysis support

**Aircraft at the Dryden Flight Research Center and the Dryden Aircraft Operations Facility**

